

A high performance, electric pump-fed LOX / RP propulsion system, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

To-date, the realization of small-scale, high-performance liquid bipropellant rocket engines has largely been limited by the inability to operate at high chamber pressures in a regeneratively-cooled environment using on-board pumps for propellant pressurization. Ventions seeks to fulfill this critical need by using a novel fabrication scheme that builds on previously-demonstrated technologies (under DARPA and NASA sponsored efforts) to design, fabricate and hot-fire test a pump-fed, 3,000lbf LOX/RP propulsion system.

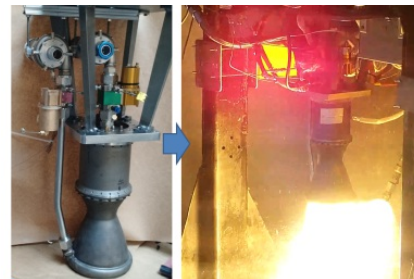
ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: A high-performance, pump-fed LOX / RP propulsion system can be expected to have several NASA applications including nano-sat launch, lunar ascent / descent (precursors, rovers, cargo, man-rated vehicles, etc.), planetary missions (ascent vehicles for payload and sample placement into orbit, sample return, etc.), and Near-Earth-Object (NEO) missions (sample return). Three specific applications that Ventions has already received customer level support from are: 1. 1st stage booster for LSP's NEXT launch vehicle; 2. Outer planet orbit capture / insertion for missions such as Europa and Uranus orbiters; and 3. Planetary ascent applications in the Mars Ascent Vehicle.

To the commercial space industry:

Potential Non-NASA Commercial Applications: Non-NASA applications for high-performance micro-rocket engines enabled by the proposed pump technology are likely to include commercial / military launch vehicles for low-cost and on-demand access to space for a variety of micro / small satellite payloads, upper stage propulsion for orbit insertion of commercial satellites, apogee kick motors for orbit circularization of commercial satellites, etc. Additionally, the pump itself is expected to have non-aerospace applications in industrial cryogenic pumping

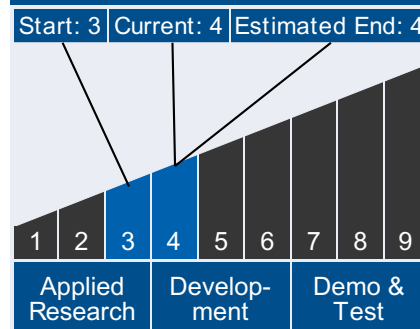


A high performance, electric pump-fed LOX / RP propulsion system, Phase II

Table of Contents

Abstract	1
Anticipated Benefits	1
Technology Maturity	1
Management Team	1
U.S. Work Locations and Key Partners	2
Technology Areas	2
Image Gallery	3
Details for Technology 1	3

Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Continued on following page.

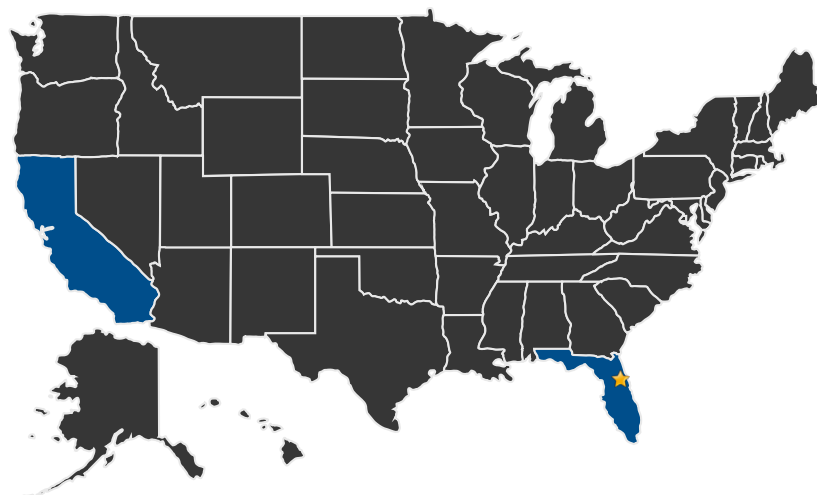
A high performance, electric pump-fed LOX / RP propulsion system, Phase II Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



applications, and as a replacement for small-scale, high-pressure liquid pumps. Four specific applications that Ventions has already received customer level support from are: 1. Prototype upper stage for DARPA's XS-1 program; 2. DARPA's next generation rocket engine exploring feasibility of modular rocket approaches such as aero-spike engines; 3. DARPA's ALASA program; and 4. Lunar lander propulsion for a commercial customer.

U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Kennedy Space Center

Other Organizations Performing Work:

- Ventions, LLC (San Francisco, CA)

PROJECT LIBRARY

Presentations

- Briefing Chart
 - (<https://techport.nasa.gov:443/file/22949>)

Continued on following page.

Management Team (cont.)

Program Manager:

- Carlos Torrez

Project Manager:

- Garrett Skrobot

Principal Investigator:

- Adam London

Technology Areas

Primary Technology Area:

In-Space Propulsion
Technologies (TA 2)

- └ Chemical Propulsion (TA 2.1)
 - └ Liquid Storable (TA 2.1.1)
 - └ Bipropellants (TA 2.1.1.2)

Secondary Technology Area:

Launch Propulsion Systems (TA 1)

- └ Liquid Rocket Propulsion Systems (TA 1.2)
 - └ RP/LOX Based (TA 1.2.2)

Additional Technology Areas:

In-Space Propulsion
Technologies (TA 2)

- └ Chemical Propulsion (TA 2.1)

A high performance, electric pump-fed LOX / RP propulsion system, Phase II Project

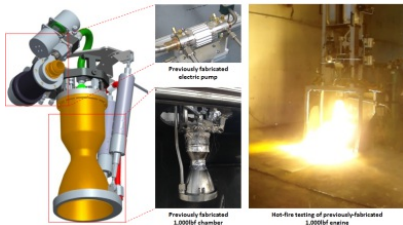
SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



Presentations (cont.)

- Final Summary Chart
 - (<https://techport.nasa.gov:443/file/20384>)

IMAGE GALLERY



*A high performance, electric pump-fed
LOX / RP propulsion system, Phase II*

DETAILS FOR TECHNOLOGY 1

Technology Title

A high performance, electric pump-fed LOX / RP propulsion system